4.1.2 Groundwater Analytical Results

Four groundwater samples were collected during the groundwater evaluation investigation. The groundwater samples were analyzed for total xylene using USEPA Method 8020. Total xylene was detected in three of the four groundwater samples. The concentrations of xylene ranged from not detected in Monitoring Well JLM032 to 220 micrograms per liter (ug/L) in Monitoring Well PZX-1. The xylene concentrations in the groundwater are illustrated on Figure 7. The groundwater analytical results are summarized in Table 3 and the laboratory analytical reports are contained in Appendix C.

4.2 QUALITY ASSURANCE/QUALITY CONTROL

Analytical results of the subsurface and groundwater samples collected during the Groundwater Evaluation Study were evaluated using the United States Environmental Protection Agency (USEPA) Contract Laboratory Program National Functional Guidelines for Organic Data Review (NFGO), (USEPA 1993). The quality assurance/quality control review included laboratory method blanks, trip blanks, matrix spike/matrix spike duplicates (MS/MSD), field duplicates, and equipment rinsate blanks.

The quality assurance/quality control results are listed below.

- Chain-of-Custody forms were signed by the relinguisher and reviewer.
- All analyses were performed as requested.
- All samples were analyzed within the required 14 day holding times.

- All laboratory method blanks for the sampling events contained no positive detections of the target analysis.

- No positive detections of the target analyte were reported in the rinsate blanks.

- There were no positive detections of the target analytes in the trip blanks.

- All surrogate percent recovery were within the required QC limits.

Based on the results of the quality assurance/quality control review, the data are valid for use (as qualified) in reporting the results of the investigation. The quality assurance/quality control review is presented in Appendix D.

* * * * *

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 CONCLUSIONS

5.1.1 Subsurface Soil Sampling

A subsurface soil sample was collected from the north, south, east, and west sides of the Xylene Site. FPX was encountered in the Soil Boring JLM029, which is south of the Xylene Site within 25 feet of the pumping station. Soil Sample JLM029-1 indicated the presence of this FPH by the elevated levels of xylene (2,700,000 ug/kg) in the soil sample. Low concentrations of xylene (below 1300 ug/kg) were detected in Soil Samples JLM031-1 and JLM032-1, which are located to the east and north of the Xylene Site. Xylene was not detected in Soil Sample JLM030-1, which is located to the west of the Xylene Site.

5.1.2 Groundwater Sampling

FPX was encountered in Monitoring Wells JLM029, PZX-2, PZX-3, PZX-4, PZX-5, PZX-6, PZX-7, and PZX-8. These monitoring wells were not sampled because of the presence of FPX. In addition, Monitoring Well PZX-9 was not sampled because the screened interval is below the water table.

A groundwater sample was collected from Monitoring Wells JLM030, JLM031, JLM032 and PZX-1, and analyzed for total xylene. The concentration of xylene in the groundwater samples ranged from below detection limits (less than 2 ug/L) to 220 ug/L. These xylene concentrations are significantly below the USEPA MCL of 10 mg/L or 10,000 ug/L.

5.2 RECOMMENDATIONS

The results of the groundwater evaluation at the Xylene Site indicate that the approximate extent of the xylene associated with the xylene release has been defined. Therefore, no additional investigation activities are proposed for the Xylene Site.

In order to mitigate further migration of the FPX and increase the recovery of FPX , Amoco implemented the installation of the wellpoint/VRD recovery system. The wellpoint/VRD system was installed along the northern and western fencelines of the Xylene Site in order to provide gradient control and recover the FPX. The FPX is being used in conjunction with the existing recovery well (RWX-1) previously installed at the Xylene Site. The location of the wellpoint/VRD recovery system is illustrated on Figure 8.

Since the approximate extent of the xylene at the Xylene Site has been delineated and the wellpoint/VRD recovery system is in operation, no further action, with the exception of the recovery system operation and maintenance, is recommended.

* * * * *

6.0 REFERENCES

Burns & McDonnell Waste Consultants, Inc., December 1995, Groundwater Evaluation Study Plan for the Amoco Pipeline Xylene Site, Amoco Corporation, Hammond, Indiana.

United States Environmental Protection Agency (USEPA), 1988, Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final, USEPA/540/6-89/004, OSWER Directive 9355.3-01.

United States Environmental Protection Agency (USEPA), 1986, Test Methods for Evaluating Solid Waste, Third Edition, as amended by Update I (Federal Register, August 31, 1993), SW-846.

Watson, L.R., Shedlock, R.J., Banaszak, K.J., Arihood, L.D., Doss, P.K., 1989, Preliminary Analysis of the Shallow Groundwater System in the Vicinity of the Grand Calumet River/Indiana Harbor Canal, Northwestern Indiana: U.S. Geological Survey Open-File Report 88-492, 45 p.

* * * * *

TABLES

Table 1
Relative Groundwater Elevations
Amoco Xylene Site
Hammond, Indiana

Monitoring Well Location	Date	TOC MSL (ft.)	Depth to Product (ft.)	Depth to Groundwater (ft.)	Corrected Groundwater Elevation (ft.)	Total Depth (ft.)
PZX-1	05/07/96	588.06	trace	5.08	582.98	16.83
	05/08/96		trace	5.05	583.01	16.83
PZX-2	05/07/96	588.16	4.92	5.56	583.16*	19.41
	05/08/96		4.95	5.53	583.13*	19.41
PZX-3	05/07/96	587.53	4.35	6.38	582.92*	18.40
	05/08/96		4.35	6.33	582.92*	18.40
PZX-4	05/07/96	585.43	2.32	6.95	582.51*	17.50
	05/08/96		2.28	7.05	582.53*	17.50
PZX-5	05/07/96	583.75	0.95	1.03	582.79*	16.15
	05/08/96		0.94	1.00	582.80*	16.15
PZX-6	05/07/96	585.46	2.46	8.26	582.25*	13.76
	05/08/96		2.49	8.32	582.21*	13.76
PZX-7	05/07/96	585.00	1.96	4.66	582.69*	17.28
	05/08/96		1.98	4.65	582.67*	17.28
PZX-8	05/07/96	588.15	4.66	5.75	583.35*	20.03
	05/08/96		4.69	5.77	583.32*	20.03
PZX-9	05/07/96	585.68	--	3.67	582.02	NM
	05/08/96		--	3.63	582.05	NM
JLM029	05/07/96	585.64	2.74	3.16	582.85*	11.04
	05/08/96		2.74	3.88	582.75*	13.10
JLM030	05/07/96	584.75	--	1.21	583.54	10.20
	05/08/96		--	1.38	583.37	14.15
JLM031	05/07/96	584.84	trace	1.87	582.97	14.40
	05/08/96		trace	1.92	582.92	16.25
JLM032	05/07/96	583.65	--	0.95	582.70	12.60
	05/08/96		--	0.91	582.74	15.91

Notes:

-- = Not measurable with interface probe.
* Groundwater elevations adjusted for presence of product using:

$$Zaw = (1 - rp)Zpw + rp\ Zap$$

Zaw = Corrected elevation of air/water interface
rp = Density of product (0.83 for diesel)
Zpw = Elevation of product/water interface
Zap = Elevation of air/product interface

Table 2
Soil Analytical Results
Amoco Xylene Site
Hammond, Indiana

Sample No.	Date Sampled	Depth Sampled (ft)	Total Xylenes (µg/kg)
JLM029	5-1-96	1 to 3	2,700,000
TB	5-1-96	NA	U (2)
JLM030-1	5-2-96	2 to 4	U (2)
JLM031-1	5-2-96	1 to 3	320
JLM031-6	5-2-96	1 to 3	460
JLM031-ERB	5-2-96	NA	U (2)
TB5296	5-2-96	NA	U (2)
JLM032-1	5-3-96	1 to 3	1300 E
JLM032-1	5-3-96	1 to 3	630
TB5396	5-3-96	NA	U (2)

µg/kg = Micrograms per kilogram
NA = Not applicable
U (2) = Not detected above practical quantitation limit (PQL)
E = Concentration reported for this compound exceeds the calibration range of the instrument
JLM031-6 is a duplicate of JLM031-1.

Note: Sample JLM032 was not homogeneous and therefore, was analyzed twice.
Sample JLM031-ERB is a equipment rinsate blank of the decontaminated split spoon from Sample JLM031-1.

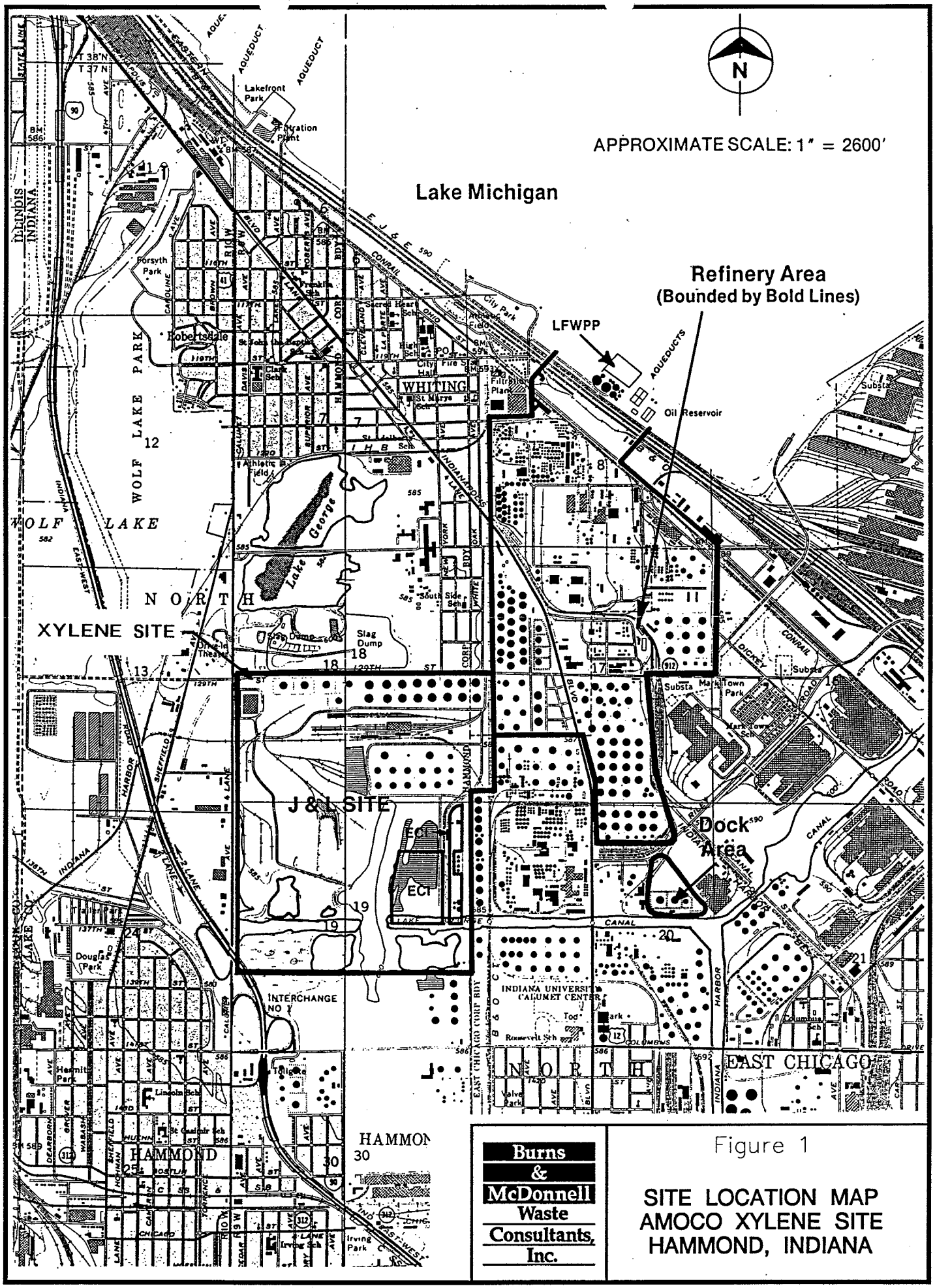
Table 3
Groundwater Analytical Results
Amoco Xylene Site
Hammond, Indiana

Sample No.	Date Sampled	Total Xylenes (µg/L)
MW-JLM030 GW-1	5-8-96	53
MW-PZX0 GW-1	5-8-96	52
MW-JLM031 GW-1	5-8-96	110
MW-JLM32 GW-1	5-8-96	U (2)
MW-PZX1 GW-1	5-8-96	220
MW-JLM031 GW-ERB	5-8-96	U (2)
TB 5-8-96	5-8-96	U (2)

µg/L = Micrograms per liter
U (2) = Not detected above the practical quantitation limit (PQL)
TB = Trip blank

Note: MW-PZX0 GW-1 is a duplicate of MW-JLM030 GW-1.
MW-JLM031 GW-ERB is a equipment rinsate of a disposal bailer.

FIGURES



Burns & McDonnell Waste Consultants, Inc.

Figure 1

SITE LOCATION MAP
AMOCO XYLENE SITE
HAMMOND, INDIANA

LEGEND

- ● SOIL BORING LOCATION
- □ EXISTING RECOVERY WELL LOCATION
- △ EXISTING MONITORING WELL LOCATION
- ⊕ NEWLY INSTALLED MONITORING WELL LOCATION
- PL PIPE LINE
- G GAS
- OH OVERHEAD UTILITIES
- W WATER LINE

129TH STREET

CALUMET AVENUE

DITCH

BEAUTIFICATION WALL

JLM032

JLM031

JLM030

JLM029

JLM029A

PZX-1

PZX-2

PZX-3

PZX-4

PZX-5

PZX-6

PZX-7

PZX-8

PZX-9

RWX-1

S-59A

S-59B

S-80A

OFFICE

XYLENE PUMPHOUSE

RECOVERY SYSTEM BUILDING

FENCE

CALUMET WAREHOUSE

NORTH

50 0 50 100

SCALE IN FEET

K:\AMOCO\WHITING\WCI\AO\XYLENE\2XYLWP.DWG 6-17-96

Burns & McDonnell Waste Consultants, Inc.

Figure 2

UTILITY LOCATION MAP
AMOCO XYLENE SITE
HAMMOND, INDIANA

LEGEND

- ● SOIL BORING LOCATION
- □ EXISTING RECOVERY WELL LOCATION
- △ EXISTING MONITORING WELL LOCATION
- ⊕ NEWLY INSTALLED MONITORING WELL LOCATION
- A-A' LINE OF GEOLOGIC CROSS SECTION

129TH STREET

JLM032

PZX-5 △

△ PZX-1

BEAUTIFICATION WALL

△PZX-3 PZX-2△

A' JLM031

A JLM030

△PZX-7

PZX-9

PZX-6

RWX-1

△S-59A

△S-59B

OFFICE

PZX-4△

△PZX-8

XYLENE PUMPHOUSE

RECOVERY SYSTEM BUILDING

FENCE

JLM029

JLM029A

DITCH

CALUMET AVENUE

S-80A △

CALUMET WAREHOUSE

NORTH

50 0 50 100

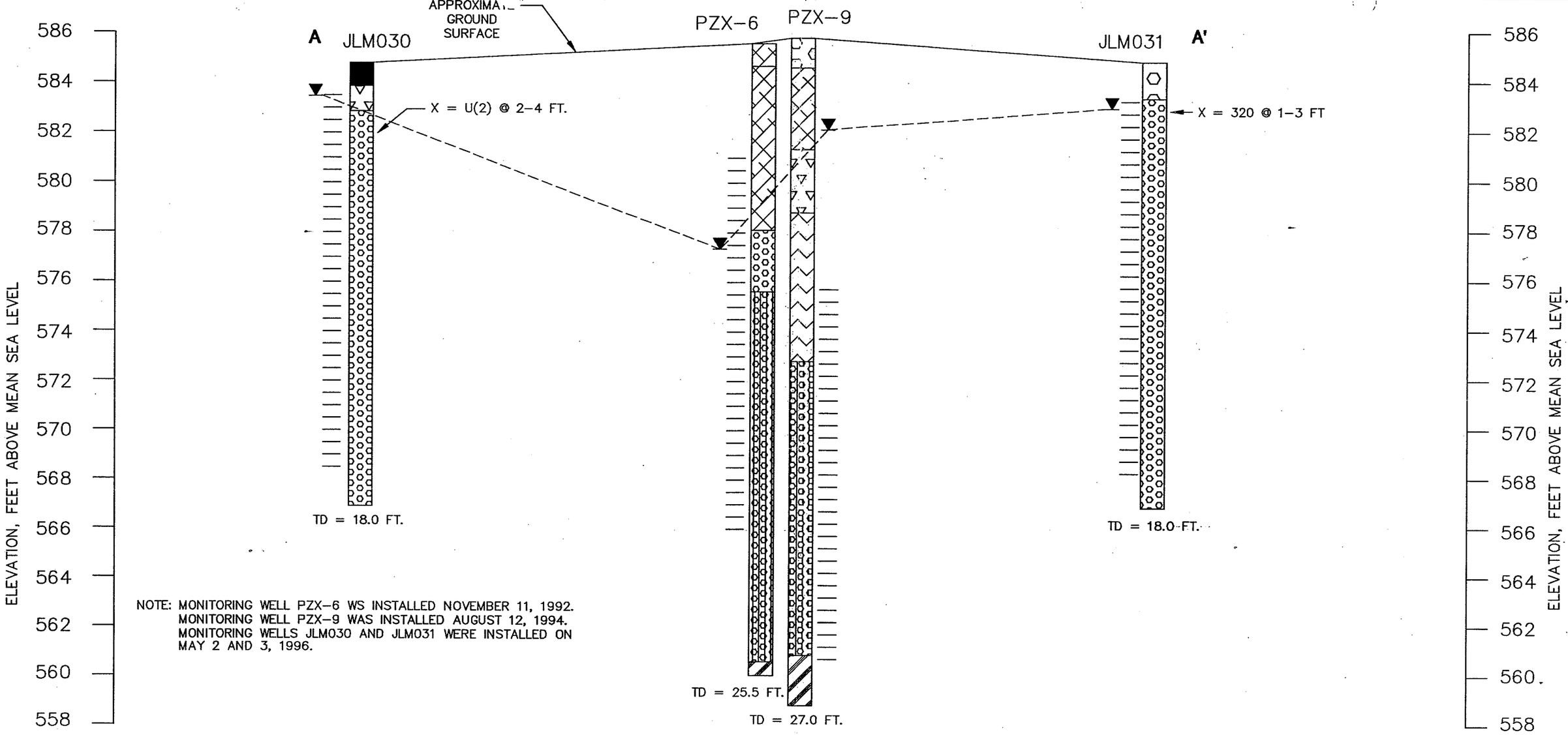
SCALE IN FEET

Burns & McDonnell Waste Consultants, Inc.

Figure 3

SITE MAP
XYLENE AREA
WHITING REFINERY
WHITING, INDIANA

K:\AMOCO\WHITING\WCI\AO\XYLENE\2XYLWP.DWG 6-17-96



NOTE: MONITORING WELL PZX-6 WS INSTALLED NOVEMBER 11, 1992.
MONITORING WELL PZX-9 WAS INSTALLED AUGUST 12, 1994.
MONITORING WELLS JLM030 AND JLM031 WERE INSTALLED ON MAY 2 AND 3, 1996.

LEGEND

X = 320 @ 1-3 FT	XYLENE (X) CONCENTRATION IN MICROGRAMS PER KILOGRAM AND SAMPLE DEPTH IN FEET
U(2)	NOT DETECTED ABOVE PRACTICAL QUANTITATION LIMIT
MW	MONITORING WELL
TD	TOTAL DEPTH IN FEET
	SCREENED INTERVAL
	WATER LEVEL (5-8-96)

- ASPHALT
- FILL MATERIAL
- GRAVEL FILL
- SLAG
- HUMUS/PEAT
- CL CLAY HIGH PLASTICITY
- SM SILTY SAND
- SP POORLY GRADED FINE TO MEDIUM SAND

4 0 4 8
VERTICAL SCALE IN FEET
50 0 50 50
HORIZONTAL SCALE IN FEET

Burns & McDonnell Waste Consultants, Inc.

Figure 4
GEOLOGIC CROSS SECTION A-A'
AMOCO XYLENE SITE
HAMMOND, INDIANA

K:\AMOCO\WHITING\WCT\AO\XYLENE\XAAXS.DWG 8-17-96

LEGEND

- ● SOIL BORING LOCATION
- □ EXISTING RECOVERY WELL LOCATION
- PZX-1 △ 583.01 — EXISTING MONITORING WELL LOCATION AND GROUNDWATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL
- JLM032 ⊕ 582.74 — NEWLY INSTALLED MONITORING WELL LOCATION AND GROUNDWATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL

129TH STREET

JLM032
582.74

PZX-5
582.80

PZX-1
583.01

BEAUTIFICATION WALL

PZX-3
582.92

PZX-2
582.71

583.0

JLM031
582.92

PZX-7
582.67

JLM030
583.37

S-59A

S-59B

PZX-9
582.05

PZX-6
582.21

RWX-1

PZX-4

OFFICE

XYLENE PUMPHOUSE

RECOVERY SYSTEM BUILDING

FENCE

PZX-8
583.32

JLM029
582.75

583.0

JLM029A

DITCH

CALUMET AVENUE

S-80A

CALUMET WAREHOUSE

NORTH

50 0 50 100

SCALE IN FEET

NOTE: GROUNDWATER ELEVATIONS FOR MONITORING WELLS JLM029, AND PZX-1 THROUGH PZX-8 WERE CORRECTED FRO THE PRESENCE OF FREE PHASE XYLENE.

Burns & McDonnell Waste Consultants, Inc.

Figure 5
GROUNDWATER ELEVATION MAP MAY 8, 1996 AMOCO XYLENE SITE HAMMOND, INDIANA

K:\AMOCO\WHITING\WCI\AO\XYLENE\2XYLWP.DWG 6-17-96

LEGEND

- ● SOIL BORING LOCATION
- □ EXISTING RECOVERY WELL LOCATION
- △ EXISTING MONITORING WELL LOCATION
- JLM031 / 320 @ 1-3 FT. — NEWLY INSTALLED MONITORING WELL LOCATION WITH XYLENE CONCENTRATION IN MICROGRAMS PER KILOGRAM AND DEPTH OF SAMPLE IN FEET
- U(2) = NOT DETECTED ABOVE THE PRACTICAL QUANTITATION LIMIT
- E = THE CONCENTRATION REPORTED FOR THIS COMPOUND EXCEEDS THE CALIBRATION RANGE OF THE INSTRUMENT

129TH STREET

JLM032
1300E @ 1-3 FT.
630 @ 1-3 FT.

PZX-5 △

△ PZX-1

BEAUTIFICATION WALL

△PZX-3 PZX-2△

△ PZX-7

JLM030
U(2) @ 2-4 FT

△S-59A
△S-59B

JLM031
320 @ 1-3 FT

PZX-9
PZX-6 △
□ RWX-1

PZX-4△

OFFICE

△ PZX-8

XYLENE PUMPHOUSE

RECOVERY SYSTEM BUILDING

FENCE

JLM029
2,700,000 @ 1-3 FT

JLM029A

DITCH

CALUMET AVENUE

S-80A △

CALUMET WAREHOUSE

NORTH

50 0 50 100
SCALE IN FEET

NOTE: SAMPLE JLM032-1 WAS NOT HOMOGENEOUS, THEREFORE THE SAMPLE WAS ANALYZED TWICE.

Burns & McDonnell Waste Consultants, Inc.

Figure 6
XYLENE CONCENTRATIONS IN SOIL AMOCO XYLENE SITE HAMMOND, INDIANA

K:\AMOCO\WHITING\WCI\AO\XYLENE\2XYLWP.DWG 6-17-96

LEGEND

- ● SOIL BORING LOCATION
- PZX-1 □ EXISTING RECOVERY WELL LOCATION
- 220 △ EXISTING MONITORING WELL LOCATION WITH XYLENE CONCENTRATION IN MICROGRAMS PER LITER
- JLM 030 53 ⊕ NEWLY INSTALLED MONITORING WELL LOCATION WITH XYLENE CONCENTRATION IN MICROGRAMS PER LITER.
- FPX FREE PHASE XYLENE
- U(2) = NOT DETECTED ABOVE PRACTICAL QUANTITATION LIMITS

129TH STREET

JLM032
U(2)

PZX-5 △ FPX

△ PZX-1
220

BEAUTIFICATION WALL

△ PZX-3
FPX

PZX-2△
FPX

JLM030
53

△S-59A
△
S-59B

△ PZX-7
FPX

PZX-9
△FPX

PZX-6
FPX△

□ RWX-1

JLM031
110

PZX-4△FPX

OFFICE

△FPX
PZX-8

XYLENE
PUMPHOUSE

RECOVERY SYSTEM BUILDING

FENCE

DITCH

CALUMET AVENUE

JLM029
FPX

JLM029A

S-80A
△

CALUMET
WAREHOUSE

NORTH

50 0 50 100
SCALE IN FEET

NOTE: MONITORING WELLS DENOTED WITH FPX WERE NOT SAMPLED DUE TO PRESENCE OF FREE PHASE XYLENE.

Burns & McDonnell Waste Consultants, Inc.

Figure 7
XYLENE CONCENTRATION IN GROUNDWATER AMOCO XYLENE SITE HAMMOND, INDIANA

K:\AMOCO\WHITING\WCI\AO\XYLENE\2XYLWP.DWG 6-17-96

LEGEND

- ● SOIL BORING LOCATION
- □ EXISTING RECOVERY WELL LOCATION
- △ EXISTING MONITORING WELL LOCATION
- ⊕ NEWLY INSTALLED MONITORING WELL LOCATION
- WP-30○ WELLPOINT/VRD WELL

129TH STREET

JLM032

PZX-5 △

△ PZX-1

BEAUTIFICATION WALL

△PZX-3 PZX-2△

WP-19 WP-32 WP-31 WP-18 WP-17 WP-16 WP-15 WP-14 WP-13 WP-12 WP-11 WP-10 WP-9 WP-8 WP-7 WP-6 WP-5 WP-4 WP-3 WP-2 WP-1

WP-33 WP-34 WP-20 WP-21 WP-22 WP-23 WP-24 WP-25 WP-26 WP-27 WP-28 WP-29 WP-30

JLM030

△S-59A
△S-59B

△ PZX-7

PZX-9 △

PZX-6 △

□ RWX-1

JLM031

RECOVERY SYSTEM HEADER LINE

OFFICE

PZX-4△

△ PZX-8

XYLENE PUMPHOUSE

RECOVERY SYSTEM BUILDING

FENCE

JLM029

JLM029A

DITCH

CALUMET AVENUE

S-80A △

CALUMET WAREHOUSE

NORTH

50 0 50 100

SCALE IN FEET

Burns & McDonnell Waste Consultants, Inc.

Figure 8
WELLPOINT/VRD RECOVERY SYSTEM LOCATION AMOCO XYLENE SITE HAMMOND, INDIANA

K:\AMOCO\WHITING\WCI\AO\XYLENE\2XYLWP.DWG 6-17-96

APPENDIX A

DRILLING LOGS

Drilling Log

Project Name: Amoco - Xylene	Project Number: 95-465-4-501	Boring Number: JLM029A	
Ground Elevation: NM	Location: South of Pumping Station	Page: 1 of 1	
Air Monitoring Equipment: OVM 580B & MSA 360		Total Footage: 10'	

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Of Core Boxes
HSA	4.25 I.D.	10.0	0	4	0

Drilling Company: Fox Drilling		Driller (s): Gary Yockey	
Drilling Rig: ATV - CME 55		Type of Sampler: Split Spoon 2" x 2'	
Date: 5/1/96	To: 5/1/96	Field Observer (s): Scott Kolb	

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
1	Asphalt on surface.									start 8:45a
2	Topsoil, dark brown. SAND, fine to medium, a little c-sand black, strong petroleum odor		11/17/50 for 5"	16/18		1	0	0	4.8 PID	
3							0	2	LEL	
4	SAND, fine to medium, black, strong petroleum odor		10/8/7/6	20/24		2	0	2.1	738 PID	
5							0		LEL	
6	SAND, medium to coarse, black wet, strong petroleum odor		3/4/3/4			3	0	24	2170 PID	
7							0	1	LEL	
8										
9			3/5/7/7			4	0.5	62	1380 PID	
10							0	NM	NM LEL	
11	Total Depth 10.0'									9:15a completed Backfilled boring with bentonite to 0.5 feet. Asphalt to surface.
12										
13										
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

Burns & McDonnell Waste Consultants, Inc.

Drilling Log

Project Name: Amoco - Xylene	Project Number: 95-465-4-501		Boring Number: JLM029
Ground Elevation: 585.97	Location: South of Xylene Pumping Station		Page: 1 of ~~2~~ 2
Air Monitoring Equipment: OVM580B & MSA 360			Total Footage: 18.0

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Of Core Boxes
HSA	4.25" I.D.	18.0	0	5	0

Drilling Company: Fox Drilling		Driller (s): Gary Yockey	
Drilling Rig: ATV CME 55		Type of Sampler: Split Spoon 2"	
Date: 0945 5/1/96	To: 1130 5/1/96	Field Observer (s): Scott Kolb.	

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
1	Asphalt on Surface.									started 9:45a
2	Topsoil, dark brown		17							
	SLAG, strong Petroleum odor		50 for 3"			1	0	Nm	2803	PID (ppm)
3							Split Spoon (SS) - 25 ppm			
4	SAND, medium to coarse, black strong petroleum odor		5/7/5/23	12/24		2	0.5	20.4	3407 1080	PID (ppm)
							0	0	Nm	LEL (%)
5										
6	SAND, medium to coarse, black strong petroleum odor		12/16/10/4	16/24		3	0	66	342	PID (ppm)
							0	0	Nm	LEL (%)
7							S.S - 161 ppm			
8										
9										
10										
11	SAND, fine to medium, grey wet		3/5/6/12	18/24		4	0	160	1107 870	PID (ppm)
							0	0		LEL (%)
12							S.S - 1.6 ppm			
13										
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

Burns & McDonnell | Waste Consultants, Inc.

Drilling Log Continuation

Project Name	Amoco - Xylene
Project Number	95-465-4-501
Boring Number	JLM029
Page	2 of 2
Date	5/1/96

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
15										
16	SAND, fine, grey, wet.					5	0	96	104.4	PID (ppm)
							0	0	NM	LEL (%)
17							SS - 2.1			
18	Total Depth @ 18.0'									Completed @ 11:30a
19										Installed 15' of 2" stainless steel screen (10 slot) to a depth of 17.0'. Riser to surf.
20										Gravel packed to 1.8 feet bgs. Bentonite pellets to 0.8 ft. bgs.
21										Cement to surface.
22										Grouted protective cover flush
23										Finished well @ 3:00p
24										
25										

BZ=Breathing Zone BH=Bore Hole S=Sample

Burns & McDonnell Waste Consultants, Inc.

Drilling Log

Project Name: Amoco Xylene.	Project Number: 95-465-4-501		Boring Number: JLM 030
Ground Elevation: 584.86	Location: West of Pumping Station		Page: 1 of 2
Air Monitoring Equipment: OVM 580B & MSA 360			Total Footage: 18

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Of Core Boxes
HSA	4.25" I.D.	18.0	0	5	0

Drilling Company: Fox Drilling		Driller (s): Gary Yockey	
Drilling Rig: ATV CME 55		Type of Sampler: Split Spoon	
Date: 5/2/96 7:30	To: 5/2/96	Field Observer (s): Scott Kolb	

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
1	Asphalt on Surface.									Start @ 7:15a
2	Topsoil. SLAG	7/30	7/30	9/12		1	0	NM	12.6	PID
3	SAND, fine, black, wet, petroleum odor.		5/7/7/7	15/24		2	0	NM	27.3	PID
4										
5										
6	SAND, medium to coarse, black, wet, petroleum odor		2/1/2/1	10/24		3	0	14	62.4	PID
7							5.5 - 12 ppm			
8										
9										
10										
11	SAND, fine to medium, grey, wet		6/5/5/9	16/24		4	0	9.4	12.0	PID
							0	0	NM	LEL
12							55. - 0. ppm			
13										
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

Burns & McDonnell Waste Consultants, Inc.

Drilling Log Continuation

Boring Number SLM030
Project Name Amoco Xylene
Page 2 of 2
Project Number 95-465-4-501
Date 5/2/96

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
15	SAND, fine to medium, grey, wet									
16			4/9/9/9	24/24		5	0	4.8	6.1	PID(ppm)
17							0	0	NM	LEL(%)
							55.	0	ppm	
18	Total Depth @ 18.0'									Stopped 9:00a. Installed 15' Stainless steel screen to 1.5' Riser to surf. Screen was 10-slot Gravel pack to 1.5 ft 1' bentonite pellets. cement to surf. Flush mount covers. Completed 10:30a

BZ=Breathing Zone BH=Bore Hole S=Sample

Burns & McDonnell | Waste Consultants, Inc.

11/11/1992

Form WCI-OP2-2

Drilling Log

Project Name: Amoco - Xylene	Project Number: 95-465-4-501			Boring Number: JLM 031	
Ground Elevation: 595.21	Location: East of Pumping Station			Page: 1 of 2	
Air Monitoring Equipment: OVM 580B & MSA 361				Total Footage: 16'	
Drilling Type: HSA	Hole Size: 4.25" I.D.	Overburden Footage: 18.0	Bedrock Footage: 0	No. Of Samples: 5	No. Of Core Boxes: 0
Drilling Company: Fox Drilling			Driller (s): Gary Yockey		
Drilling Rig: ATV CME 55			Type of Sampler: Split Spoon 2"		
Date: 5/2/96	To: 5/3/96 9:30		Field Observer (s): Scott Kolb		

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
1	Gravel on Surface									
2	Topsoil, brown SAND, medium, black		2/5/7/9	16/24		1	0	0.9	114.1	PID
							0	0	Nm	LEL
3							S.S- 4.2 ppm			
4	SAND, medium, black, wet, petroleum odor		1/1/11/9	16/24		2	Nm	Nm	354	PID
							Nm	Nm	Nm	LEL
5							S.S. 13.3 ppm			
6	SAND, fine to medium, black, very wet - strong petroleum odor		4/3/1/1	12/24		3	0	6.4	1004	PID
							0	0	Nm	LEL
7							S.S. 16.4 ppm			
8										
9										
10										
11	SAND, fine, greyish black, wet petroleum odor (odor not the same as in JLM 029 & JLM030)		3/7/9/8			4	0	17.8	12.6	PID
							0	0	Nm	LEL
12							S.S- 1.6			
13										
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

Burns & McDonnell Waste Consultants, Inc.

11/14/2002

Drilling Log Continuation

Project Name	Amoco Xylene
Project Number	95-465-4-501
Boring Number	JLM 031
Page	2 of 2
Date	5/3/96

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
15										
16	SAND, fine to medium, grey, wet		11/9/11/15	24/24		5	0	41.8	59.9	PID
17							55.	-1.6		
18										
	Total Depth @ 18.0'									Completed 8:15a Installed 15' of 2" 10-slot screen - stainless steel. to 17.0. Riser to surf. Gravel pack to 1.75 1' bentonite pellets Cement to surf. Flushmount cover. Completed 9:45a
19										
20										

BZ=Breathing Zone BH=Bore Hole S=Sample

Burns & McDonnell Waste Consultants, Inc.

11/11/1992

Drilling Log

Project Name: Amoco Xylene	Project Number: 95-465-4-501	Boring Number: JLM-032
Ground Elevation: 583.81	Location: North of Pumping Station	Page: 1 of 2
Air Monitoring Equipment: OVM 580B & MSA 361		Total Footage: 19'

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Of Core Boxes
HSA	4.25' I.D.	19.0	0	5	0

Drilling Company: Fox Drilling		Driller (s): Gary Yockey	
Drilling Rig: ATV CME 55		Type of Sampler: Split Spoon 2"	
Date: 5/3/96 9:30	To: 5/3/96	Field Observer (s): Scott Kolb	

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
0	Gravel on Surface									Start @ 9:30
1	SLAG, blue & white		12/16/19/21	24/24		1	0	1.3	84.0	PID (ppm)
2										
3							S.S - 1.3			PID (ppm)
4										
5	SAND, medium, grey, wet		60/5/1/2	9/24		2	0	1.3	39.1	PID
6							S.S - NM			PID
7			3/7/6/8	12/24		3	0	12.3	1.3	PID
8							0	4	NM	LEL
9							S.S - 0			PID
10										
11	SAND, fine to medium, grey, wet		2/1/3/4	14/24		4	0	5.8	0.9	PID
12							0	0	NM	LEL
13							S.S - 1.3			
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

Burns & McDonnell Waste Consultants, Inc.

Drilling Log Continuation

Boring Number JLM 032
Project Name Amoco Xylene
Page 2 of 2
Project Number 95-4165-4-501
Date 5/3/96

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
15	SAND, fine to medium, grey, wet									
16			3/4/9/14	21/24		5-	0	0.9	0	PID
							0	0	Nm	LEL
17							5.5-	0.0	PID	
18										
19										
20	Total Depth @ 19.0'									Completed drilling at 11:30am. Installed 15' of 2" Stainless Steel Screen to a depth 17.0' Riser to surf. Sand pack to 1.67' bgs 1' bentonite pellets. Grout (cement) to surface Installed protective surface casing Completed well 12:45

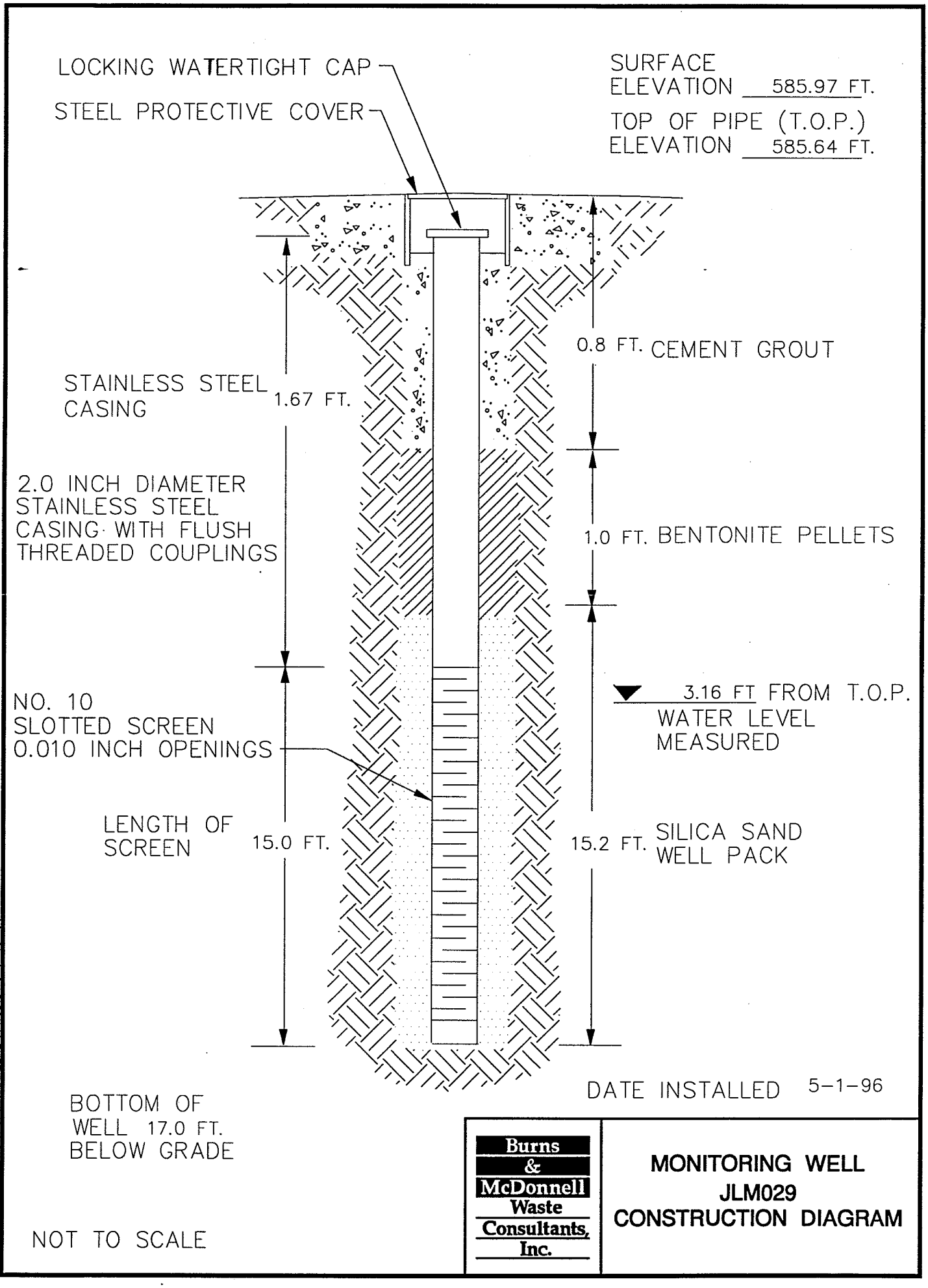
BZ=Breathing Zone BH=Bore Hole S=Sample

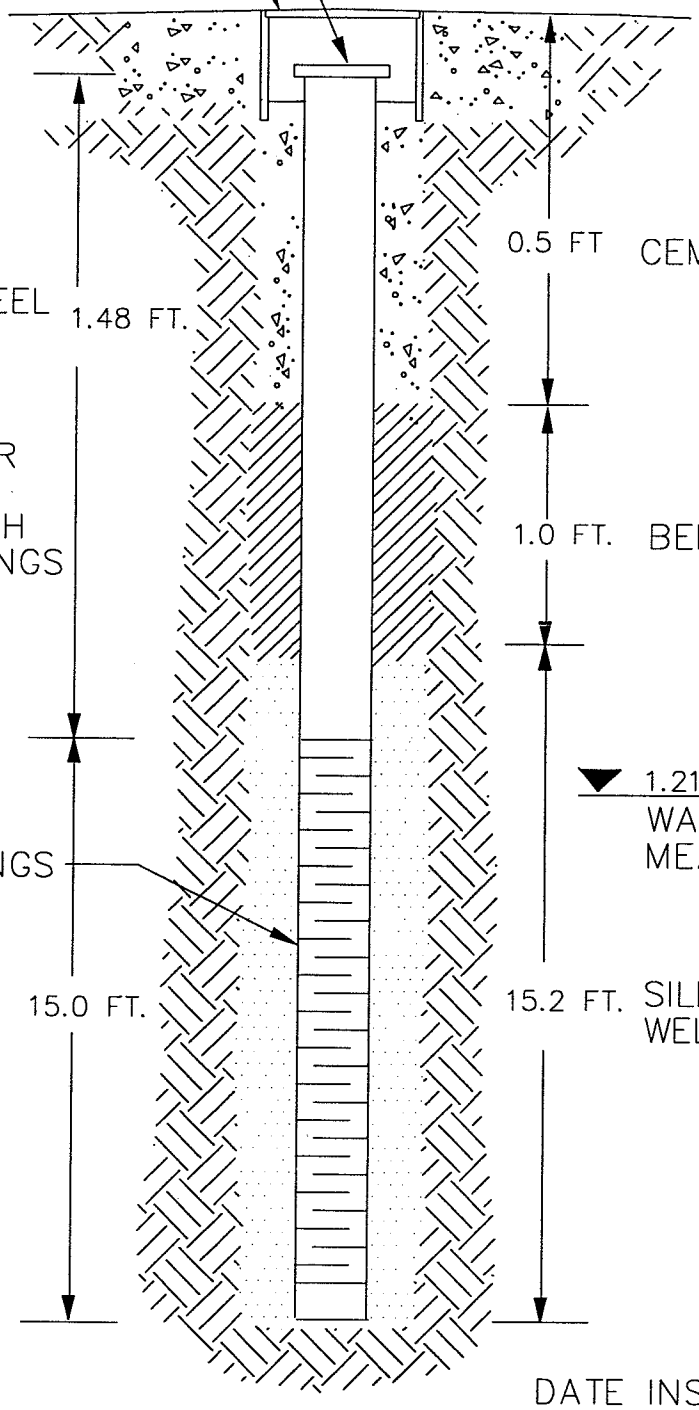
Burns & McDonnell Waste Consultants, Inc.

Form WCLOP2-2

APPENDIX B

MONITORING WELL CONSTRUCTION DIAGRAMS


LOCKING WATERTIGHT CAP
STEEL PROTECTIVE COVER
SURFACE ELEVATION 585.97 FT.
TOP OF PIPE (T.O.P.) ELEVATION 585.64 FT.
0.8 FT. CEMENT GROUT
STAINLESS STEEL CASING
1.67 FT.
2.0 INCH DIAMETER STAINLESS STEEL CASING WITH FLUSH THREADED COUPLINGS
1.0 FT. BENTONITE PELLETS
3.16 FT FROM T.O.P. WATER LEVEL MEASURED
NO. 10 SLOTTED SCREEN 0.010 INCH OPENINGS
LENGTH OF SCREEN
15.0 FT.
15.2 FT. SILICA SAND WELL PACK
DATE INSTALLED 5-1-96
BOTTOM OF WELL 17.0 FT. BELOW GRADE
NOT TO SCALE
Burns & McDonnell Waste Consultants, Inc.
MONITORING WELL
JLM029
CONSTRUCTION DIAGRAM
K:\AMOCO\WHITING\WCI\AO\XYLENE\MWCD.DWG 6-19-96

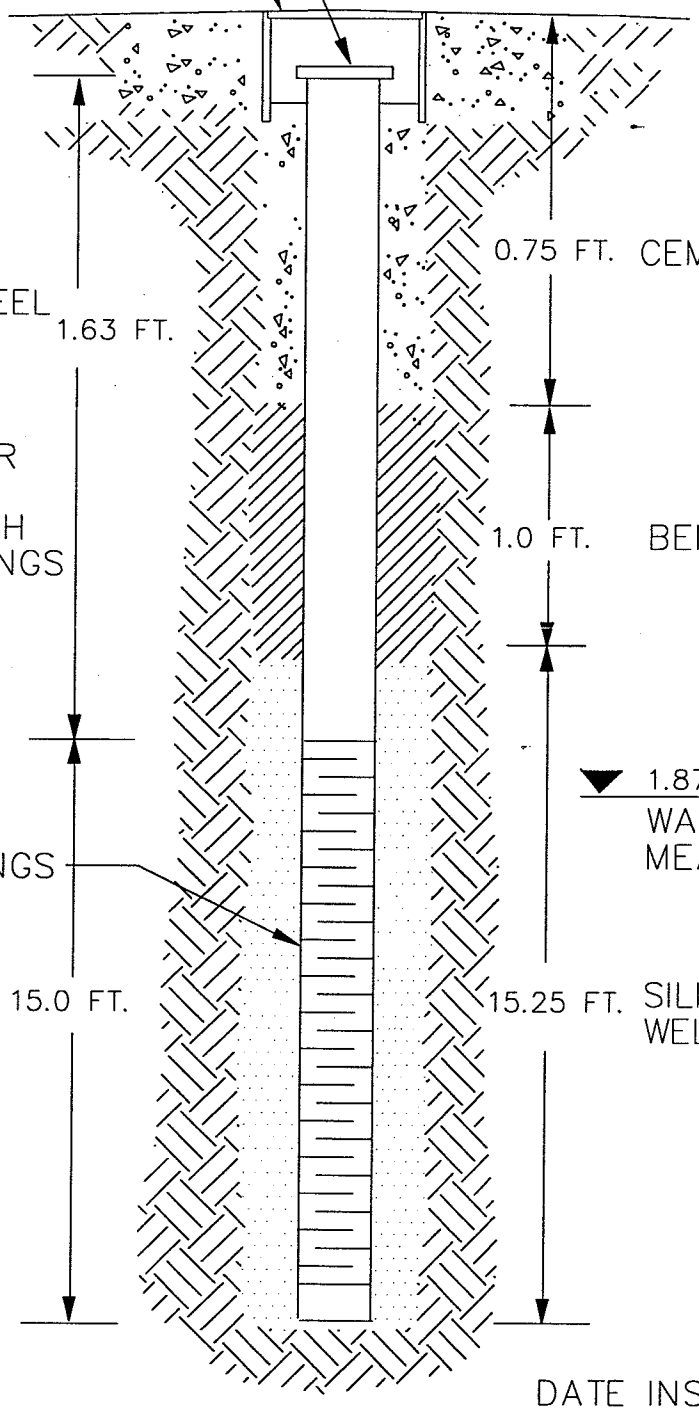


NOT TO SCALE

Burns & McDonnell Waste Consultants, Inc.

MONITORING WELL JLM030 CONSTRUCTION DIAGRAM

K:\AMOCO\WHITING\WCI\AO\XYLENE\MWCD.DWG 6-19-96



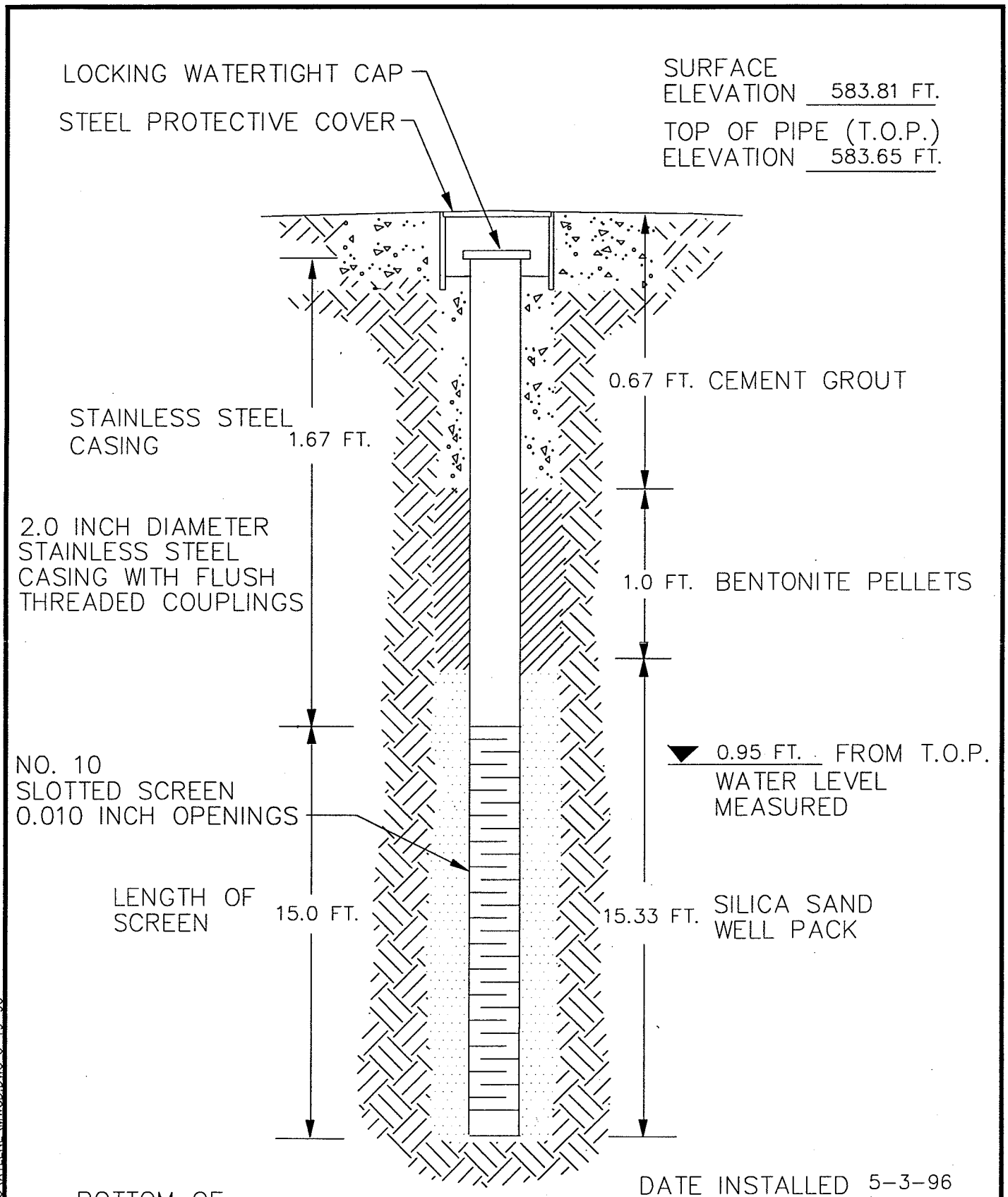
DATE INSTALLED 5-3-96

NOT TO SCALE

Burns & McDonnell Waste Consultants, Inc.

MONITORING WELL JLM031 CONSTRUCTION DIAGRAM

K:\AMOCO\WHITING\WCI\AO\XY1.ENF\MWCD.DWG 6-19-96



Burns & McDonnell Waste Consultants, Inc.

MONITORING WELL JLM032 CONSTRUCTION DIAGRAM

K:\AMOCO\WHITING\WCI\AO\XYLENE\MWCD.DWG 6-19-96

APPENDIX C

LABORATORY ANALYTICAL RESULTS

IEA
An Aquarion Company

126 West Center Court
Schaumburg, Illinois 60195

Phone 1-800-933-2580
Fax 847-705-1567

May 25, 1996

Burns & McDonnell
Scott Kolb
999 Oakmont Plaza Drive

Westmont, IL 60559

Dear Scott Kolb:

Please find enclosed the analytical results of the samples received at our laboratory on May 02, 1996. This report contains sections addressing the following information at a minimum:

-Definitions
-Analytical Methodology
-State certifications
-Analytical Results
-Chain-of-custody (if applicable)

IEA Project#: L72960720 Client Project: 95-465-4-50

Purchase Order#:

IEA Quote#: Site:

Copies of this analytical report and supporting data are maintained in our files for three years; samples are retained for two weeks unless special arrangements have been made. Unless specifically indicated, all analytical testing was performed at this laboratory and no portion of the testing was subcontracted.

We appreciate your selection of our services and welcome any questions or suggestions you may have relative to this report. Please contact Jim Dowse at (800) 933-2580 for any additional information. Thank you for utilizing our services, we hope you will consider us for your future analytical needs.

I have reviewed and approved the enclosed data for final release.

Sincerely

Larry D. Lewis
Director of Operations
IEA-Illinois Laboratory

IEA
An Aquarion Company

Definitions of Data Qualifiers

Organic Analysis

B - This analyte was detected in the method blank associated with this sample. The concentration reported in the method blank is suspected to contribute to the reported concentration of the analyte in the sample.

E - The concentration reported for this compound exceeds the calibration range of the instrument.

H - This sample had one or more surrogate recoveries above the acceptance criteria due to coelution with a nontarget compound.

J - The reported concentration for this compound is an estimated value. When associated with tentatively identified compounds (TICs), the result is quantitated based on a response factor of 1. When the flag is associated with a calibrated target compound, the compound has been positively identified and the reported concentration is above the method detection limit (MDL), but below the practical quantitation limit (PQL).

L - This sample had one or more surrogate recoveries below the acceptance criteria due to matrix effects. This effect was confirmed through a second analysis of the sample.

LI - The recovery of the internal standard corresponding to this compound did not meet the acceptance criteria due to matrix effects. This effect was confirmed through a second analysis of the sample.

T1 - The chromatographic profile of this sample does not match that of a gasoline standard. Another unidentifiable petroleum product is present in this sample. Quantitation is based on a gasoline standard calibration.

T2 - The chromatographic profile of this sample does not match that of a diesel fuel standard. Another petroleum product is present in this sample. Quantitation is based on a diesel fuel standard calibration.

U - This compound was not detected in the sample above the PQL.

UD - This compound was not detected above the elevated PQL in this diluted analysis.

Inorganic Analysis

E - The reported value was estimated due to the presence of interference.

M - Duplicate injection precision was not met.

N - Spiked sample recovery was not within control limits.

S - The reported value was determined by the Method of Standard Additions(MSA).

W - Post digestion spike for Furnace AA analysis is out of control limits (85-115%), while sample absorbance is less than 50% of spike absorbance.

* - Duplicate analysis was not within control limits.

+ - Correlation Coefficient for the MSA is less than 0.995.

IEA
An Aquarion Company

Sample Summary

IEA-Illinois

Laboratory ID	Client ID
L72960720-001	JLM029
L72960720-002	TB

IEA
An Aquarion Company

Client: Burns & McDonnell
IEA Job#: L72960720
Project ID: 95-465-4-50
Matrix: Soil
Method: 8020A

Purgeable Aromatic Compounds--BTEX
GC Volatiles Analysis
µg/Kg - Dry Weight

Analyte / Lab ID						PQL
Percent Solids	81%	100%				
Dilution Factor	10000	1				
Method Blank	VV050796	VV050796				
Client ID	JLM029	Method Blank				
Lab ID	001	VV050796				
Total Xylenes	2700000	U				2
Surrogate Recovery	98%	91%				65-135 %
Date Sampled	5/1/96	---				
Date Analyzed	5/7/96	5/7/96				

PQL = Practical Quantitation Limit
To obtain the sample-specific quantitation limit, multiply the PQL by the Dilution Factor.

IEA
An Aquarion Company

Client: Burns & McDonnell
IEA Job#: L72960720
Project ID: 95-465-4-50
Matrix: Water
Method: 8020A

Purgeable Aromatic Compounds--BTEX
GC Volatiles Analysis
µg/L

Analyte /	Dilution Factor	1	1				PQL
	Method Blank	VV050796	VV050796				
	Client ID	TB	Method Blank				
	Lab ID	002	VV050796				
Total Xylenes		U	U				2
Surrogate Recovery		92%	91%				75-125%
	Date Sampled	5/1/96	---				
	Date Analyzed	5/8/96	5/7/96				

PQL = Practical Quantitation Limit
To obtain the sample-specific quantitation limit, multiply the PQL by the Dilution Factor.

Purgeable Aromatics--Xylenes

Matrix Spike/Matrix Spike Duplicate

Matrix: Soil

Date Analyzed: 5/7/96
IEA Sample ID: BATCH MS

Compound	Spike Added (ug/Kg)	Sample Concentration (ug/Kg)	Matrix Spike Concentration (ug/Kg)	% Recovery
Total Xylenes	150	<2	97	65%

Compound	Spike Added (ug/Kg)	Matrix Spike Dup Concentration (ug/Kg)	% Recovery	% Difference
Total Xylenes	150	105	70%	8%

% Recovery Limits: 65-135 %
% Difference Limits: +/- 20 %

Purgeable Aromatics--Xylenes

Matrix Spike/Matrix Spike Duplicate

Matrix: Water

Date Analyzed: 5/7/96
IEA Sample ID: BATCH QC

Compound	Spike Added (ug/L)	Sample Concentration (ug/L)	Matrix Spike Concentration (ug/L)	% Recovery
Total Xylenes	150	<2	153	102%

Compound	Spike Added (ug/L)	Matrix Spike Dup Concentration (ug/L)	% Recovery	% Difference
Total Xylenes	150	153	102%	0%

% Recovery Limits: 75-125%
% Difference Limits: +/- 20 %

Response Factor Report GC

Method : K:\CHEMSTN\GCV\METHODS\PVOCSOIL.M
Title : PVOC in Soil; Calib. Date: 5/7/96
Last Update : Tue May 14 13:26:55 1996
Response via : Initial Calibration

Calibration Files
2ppb =GCV5853.D 5 =GCV5854.D 10 =GCV5855.D
50 =GCV5856.D 100 =GCV5857.D

	RT	Compound	2ppb	5	10	50	100	Avg RF		%RSD
1)	2.27	MTBE	572.5	519.8	343.0	456.7	399.6	458.3	E3	19.98
2)	3.98	BENZENE	1.3	1.2	1.2	1.2	1.2	1.2	E6	4.75
3)	5.40	aaa-Trifluorotoluene	411.0	362.4	444.2	425.4	412.4	411.1	E3	7.37
4)	7.11	TOLUENE	1.1	1.0	1.1	1.1	1.1	1.1	E6	2.80
5)	9.89	ETHYLBENZENE	803.5	768.0	799.2	880.8	841.0	818.5	E3	5.30
6)	10.12	M-PXYLENE	1.2	1.1	1.1	1.1	1.1	1.1	E6	4.04
7)	10.77	O-XYLENE	1.1	1.0	1.0	1.0	0.9	1.0	E6	7.47
8)	11.61	BROMOFLUOROBENZENE	989.4	932.4	911.8	938.1	906.0	935.5	E3	3.53
9)	12.73	135-TRIMETHYLBENZENE	848.6	828.5	956.6	1155.2	1111.3	980.0	E3	15.19
10)	13.36	124-TRIMETHYLBENZENE	577.4	597.3	714.0	878.9	843.9	722.3	E3	19.08

(#) = Out of Range

PVOCSOIL.M Mon May 20 16:00:48 1996

Request for Chemical Analysis and Chain of Custody Record

urns & McDonnell
Waste Consultants, Inc.
0881 Lowell Avenue, Suite 200
verland Park, Kansas 66210
el: (816) 333-8787
ax: (816) 822-3463

Laboratory: IEA
Address: 126 W Center Court
City/State/Zip: Schaumburg IL 60195
Telephone: 708-705-0740

Document Control No.:
Lab. Reference No. or Episode No.:

ttention: Mr. Greg Nieman
roject Number: 95-465-4-50
Project Name: Amoco Xylene
te, Group, or SWMU Name:

Sample Number		Sample Event		Sample Depth (in feet)		Samples Collected		Sample Type: Matrix					Number of Containers	Analysis: Xylene (8020)						Remarks
ample Point	Sample Designator	Round	Year	From	To	Date	Time	Liquid	Solid	Gas	Composite	Grab								
LM029	1	—	1996	1	3	5/1/96	1015		X			X	1	X						4oz jar. None
TB	5196	—	1996	—	-	5/1/96	NA	X				X	2	X						Vial 40ml - Trip Blanks HCl

SK 5-1-96

5/1/96

ampler (signature):
ampler (signature):

Special Instructions:

elinquished By:	Date/Time	Received By:	Date/Time
(signature)	5/1/96 - 1602	(signature)	5-2-96 1000
elinquished By: (signature)	Date/Time	Received By: (signature)	Date/Time

Condition of Shipping Container: Good [X] Fair [ ] Poor [ ]
Ice Present in Container: Yes [X] No [ ]
Comments:

Burns & McDonnell Waste Consultants, Inc.

022194 form WCI-OP1

IEA
An Aquarion Company

126 West Center Court
Schaumburg, Illinois 60195

Phone 1-800-933-2580
Fax 847-705-1567

May 25, 1996

Burns & McDonnell
Scott Kolb
999 Oakmont Plaza Drive

Westmont, IL 60559

Dear Scott Kolb:

Please find enclosed the analytical results of the samples received at our laboratory on May 03, 1996. This report contains sections addressing the following information at a minimum:

-Definitions
-Analytical Methodology
-State certifications
-Analytical Results
-Chain-of-custody (if applicable)

IEA Project#: L72960732 Client Project: 95-465-4-501

Purchase Order#:

IEA Quote#: Site:

Copies of this analytical report and supporting data are maintained in our files for three years; samples are retained for two weeks unless special arrangements have been made. Unless specifically indicated, all analytical testing was performed at this laboratory and no portion of the testing was subcontracted.

We appreciate your selection of our services and welcome any questions or suggestions you may have relative to this report. Please contact Jim Dowse at (800) 933-2580 for any additional information. Thank you for utilizing our services, we hope you will consider us for your future analytical needs.

I have reviewed and approved the enclosed data for final release.

Sincerely

Larry D. Lewis
Director of Operations
IEA-Illinois Laboratory

IEA
An Aquarion Company

Definitions of Data Qualifiers

Organic Analysis

B - This analyte was detected in the method blank associated with this sample. The concentration reported in the method blank is suspected to contribute to the reported concentration of the analyte in the sample.

E - The concentration reported for this compound exceeds the calibration range of the instrument.

H - This sample had one or more surrogate recoveries above the acceptance criteria due to coelution with a nontarget compound.

J - The reported concentration for this compound is an estimated value. When associated with tentatively identified compounds (TICs), the result is quantitated based on a response factor of 1. When the flag is associated with a calibrated target compound, the compound has been positively identified and the reported concentration is above the method detection limit (MDL), but below the practical quantitation limit (PQL).

L - This sample had one or more surrogate recoveries below the acceptance criteria due to matrix effects. This effect was confirmed through a second analysis of the sample.

LI - The recovery of the internal standard corresponding to this compound did not meet the acceptance criteria due to matrix effects. This effect was confirmed through a second analysis of the sample.

T1 - The chromatographic profile of this sample does not match that of a gasoline standard. Another unidentifiable petroleum product is present in this sample. Quantitation is based on a gasoline standard calibration.

T2 - The chromatographic profile of this sample does not match that of a diesel fuel standard. Another petroleum product is present in this sample. Quantitation is based on a diesel fuel standard calibration.

U - This compound was not detected in the sample above the PQL.

UD - This compound was not detected above the elevated PQL in this diluted analysis.

Inorganic Analysis

E - The reported value was estimated due to the presence of interference.

M - Duplicate injection precision was not met.

N - Spiked sample recovery was not within control limits.

S - The reported value was determined by the Method of Standard Additions(MSA).

W - Post digestion spike for Furnace AA analysis is out of control limits (85-115%), while sample absorbance is less than 50% of spike absorbance.

* - Duplicate analysis was not within control limits.

+ - Correlation Coefficient for the MSA is less than 0.995.

IEA
An Aquarion Company

Sample Summary

IEA-Illinois

Laboratory ID	Client ID
L72960732-001	JLM031-6
L72960732-002	JLM031-1
L72960732-003	JLM030-1
L72960732-004	JLM031-ERB
L72960732-005	TB 5296

IEA
An Aquarion Company

Client: Burns & McDonnell
IEA Job#: L72960732
Project ID: 95-465-4-501
Matrix: Soil
Method: 8020A

Purgeable Aromatic Compounds--BTEX
GC Volatiles Analysis
µg/Kg - Dry Weight

Percent Solids	74%	73%	72%	100%	100%	
Dilution Factor	5	5	1	1	1	
Method Blank	VV050796	VV050796	VV050696	VV050696	VV050796	
Client ID	JLM031-6	JLM031-1	JLM030-1	Method Blank	Method Blank	PQL
Analyte / Lab ID	001	002	003	VV050696	VV050796	
Total Xylenes	460	320	U	U	U	2
Surrogate Recovery	88%	65%	71%	101%	91%	65-135 %
Date Sampled	5/2/96	5/2/96	5/2/96	---	---	
Date Analyzed	5/8/96	5/8/96	5/6/96	5/6/96	5/7/96	

PQL = Practical Quantitation Limit
To obtain the sample-specific quantitation limit, multiply the PQL by the Dilution Factor.

IEA
An Aquarion Company

Client: Burns & McDonnell
IEA Job#: L72960732
Project ID: 95-465-4-501
Matrix: Water
Method: 8020A

Purgeable Aromatic Compounds--BTEX
GC Volatiles Analysis
µg/L

Analyte / Lab ID						PQL
Dilution Factor	1	1	1			
Method Blank	VV050796	VV050796	VV050696			
Client ID	JLM031-ERB	TB 5296	Method Blank			
Lab ID	004	005	VV050696			
Total Xylenes	U	U	U			2
Surrogate Recovery	99%	101%	101%			75-125%
Date Sampled	5/2/96	5/2/96	---			
Date Analyzed	5/6/96	5/6/96	5/6/96			

PQL = Practical Quantitation Limit
To obtain the sample-specific quantitation limit, multiply the PQL by the Dilution Factor.

Purgeable Aromatics--Xylenes

Matrix Spike/Matrix Spike Duplicate

Matrix: Soil

Date Analyzed: 5/7/96
IEA Sample ID: BATCH MS

Compound	Spike Added (ug/Kg)	Sample Concentration (ug/Kg)	Matrix Spike Concentration (ug/Kg)	% Recovery
Total Xylenes	150	<2	97	65%

Compound	Spike Added (ug/Kg)	Matrix Spike Dup Concentration (ug/Kg)	% Recovery	% Difference
Total Xylenes	150	105	70%	8%

% Recovery Limits: 65-135 %
% Difference Limits: +/- 20 %

Purgeable Aromatics--Xylenes

Matrix Spike/Matrix Spike Duplicate

Matrix: Water

Date Analyzed: 5/7/96
IEA Sample ID: BATCH QC

Compound	Spike Added (ug/L)	Sample Concentration (ug/L)	Matrix Spike Concentration (ug/L)	% Recovery
Total Xylenes	150	<2	153	102%

Compound	Spike Added (ug/L)	Matrix Spike Dup Concentration (ug/L)	% Recovery	% Difference
Total Xylenes	150	153	102%	0%

% Recovery Limits: 75-125%
% Difference Limits: +/- 20 %

Response Factor Report GC

Method : K:\CHEMSTN\GCV\METHODS\CALCURVS\042996.M
Title : PVOC in Soil; Calib. Date 4/29/96
Last Update : Mon Apr 29 12:12:54 1996
Response via : Initial Calibration

Calibration Files
2ppb =GCV5680.D 5 =GCV5681.D 10 =GCV5682.D
50 =GCV5683.D 100 =GCV5684.D

	RT	Compound	2ppb	5	10	50	100	Avg		%RSD
1)	2.27	MTBE	548.4	607.6	589.8	575.3	494.5	563.1	E3	7.82
2)	3.98	BENZENE	1.5	1.6	1.6	1.6	1.5	1.6	E6	2.62
3)	5.40	aaa-Trifluorotoluene	477.2	503.9	507.2	584.9	557.4	526.1	E3	8.33
4)	7.11	TOLUENE	1.2	1.3	1.3	1.4	1.3	1.3	E6	6.30
5)	9.89	ETHYLBENZENE	779.8	830.3	833.9	940.2	901.7	857.2	E3	7.41
6)	10.12	M-PXYLENE	1.1	1.2	1.2	1.3	1.2	1.2	E6	4.66
7)	10.77	0-XYLENE	981.5	1040.2	1015.7	1124.2	1072.1	1046.7	E3	5.
8)	11.61	BROMOFLUOROBENZENE	773.6	848.2	863.3	1003.3	979.5	893.6	E3	10.73
9)	12.73	135-TRIMETHYLBENZENE	747.3	844.4	906.4	1185.1	1186.6	974.0	E3	20.70
10)	13.36	124-TRIMETHYLBENZENE	499.4	608.8	627.2	885.4	883.1	700.8	E3	24.90

(#) = Out of Range

042996.M Mon May 20 16:16:05 1996

Evalua Continuing Calibration Report

Data File : K:\CHEMSTN\GCV\DATA\QV0539\GCV5825.D Vial: 2
Acq On : 06 May 96 12:01 PM Operator: JBRIESE
Sample : CCV#1-BTEXM-50PPB Inst : GCV
Misc : GCV-0101;VV050696 Multiplr: 1.00

Method : K:\CHEMSTN\GCV\METHODS\CALCURVS\042996.M
Title : PVOC in Soil; Calib. Date 4/29/96
Last Update : Mon Apr 29 12:12:54 1996
Response via : Multiple Level Calibration

		Compound	AvgRF	CCRF	%Diff
1	t	MTBE	563.125	537.590 E3	4.5
2	T	BENZENE	1.578	1.451 E6	8.1
3	S	aaa-Trifluorotoluene	526.128	505.110 E3	4.0
4	T	TOLUENE	1.294	1.216 E6	6.0
5	T	ETHYLBENZENE	857.177	845.971 E3	1.3
6	T	M-PXYLENE	1.188	1.087 E6	8.5
7	T	0-XYLENE	1046.735	941.779 E3	10.0
8	S	BROMOFLUOROBENZENE	893.561	913.193 E3	-2.2
9	T	135-TRIMETHYLBENZENE	973.952	1065.271 E3	-9.4
10	T	124-TRIMETHYLBENZENE	700.770	786.215 E3	-12.2

(#) = Out of Range SPCC's out = 0 CCC's out = 0
GCV5683.D 042996.M Mon May 20 16:20:14 1996

Response Factor Report G\

Method : K:\CHEMSTN\GCV\METHODS\PVOCSOIL.M
Title : PVOC in Soil; Calib. Date: 5/7/96
Last Update : Tue May 14 13:26:55 1996
Response via : Initial Calibration

Calibration Files
2ppb =GCV5853.D 5 =GCV5854.D 10 =GCV5855.D
50 =GCV5856.D 100 =GCV5857.D

	RT	Compound	2ppb	5	10	50	100	Avg RF		%RSD
1)	2.27	MTBE	572.5	519.8	343.0	456.7	399.6	458.3	E3	19.98
2)	3.98	BENZENE	1.3	1.2	1.2	1.2	1.2	1.2	E6	4.75
3)	5.40	aaa-Trifluorotoluene	411.0	362.4	444.2	425.4	412.4	411.1	E3	7.37
4)	7.11	TOLUENE	1.1	1.0	1.1	1.1	1.1	1.1	E6	2.80
5)	9.89	ETHYLBENZENE	803.5	768.0	799.2	880.8	841.0	818.5	E3	5.30
6)	10.12	M-PXYLENE	1.2	1.1	1.1	1.1	1.1	1.1	E6	4.04
7)	10.77	0-XYLENE	1.1	1.0	1.0	1.0	0.9	1.0	E6	7.47
8)	11.61	BROMOFLUOROBENZENE	989.4	932.4	911.8	938.1	906.0	935.5	E3	3.53
9)	12.73	135-TRIMETHYLBENZENE	848.6	828.5	956.6	1155.2	1111.3	980.0	E3	15.19
10)	13.36	124-TRIMETHYLBENZENE	577.4	597.3	714.0	878.9	843.9	722.3	E3	19.08

(#) = Out of Range

PVOCSOIL.M Mon May 20 16:00:48 1996

Evalua Continuing Calibration Re_ ort

Data File : K:\CHEMSTN\GCV\DATA\QV0539\GCV5839.D Vial: 18
Acq On : 06 May 96 08:52 PM Operator: JBRIESE
Sample : CCV#2-BTEXM-50PPB Inst : GCV
Misc : GCV-0101;VV050696 Multiplr: 1.00

Method : K:\CHEMSTN\GCV\METHODS\CALCURVS\042996.M
Title : PVOC in Soil; Calib. Date 4/29/96
Last Update : Mon Apr 29 12:12:54 1996
Response via : Multiple Level Calibration

		Compound	AvgRF	CCRF	%Dev
1	t	MTBE	563.125	631.477 E3	-12.1
2	T	BENZENE	1.578	1.641 E6	-4.0
3	S	aaa-Trifluorotoluene	526.128	591.363 E3	-12.4
4	T	TOLUENE	1.294	1.403 E6	-8.4
5	T	ETHYLBENZENE	857.177	915.225 E3	-6.8
6	T	M-PXYLENE	1.188	1.267 E6	-6.7
7	T	0-XYLENE	1046.735	1136.820 E3	-8.6
8	S	BROMOFLUOROBENZENE	893.561	1021.009 E3	-14.3
9	T	135-TRIMETHYLBENZENE	973.952	1196.793 E3	-22.9#
10	T	124-TRIMETHYLBENZENE	700.770	898.668 E3	-28.2#

(#) = Out of Range SPCC's out = 0 CCC's out = 0
GCV5683.D 042996.M Mon May 20 16:22:55 1996

Request for Chemical Analysis and Chain of Custody Record

Burns & McDonnell
Waste Consultants, Inc.
10881 Lowell Avenue, Suite 200
Overland Park, Kansas 66210
Tel: (816) 333-8787
Fax: (816) 822-3463

Laboratory: IEA Inc.
Address: 126 West Carter Court
City/State/Zip: Schaumburg IL 60195
Telephone: 708/705-0744

Document Control No.:
Lab. Reference No. or Episode No.:

Attention: Mr Greg Niemann
Project Number: 95-405-4-501
Project Name: Amoco-Xylene
Site, Group, or SWMU Name:

Sample Number		Sample Event		Sample Depth (in feet)		Samples Collected		Sample Type: Matrix					Number of Containers	Analysis: Xylene 8020							Remarks
Sample Point	Sample Designator	Round	Year	From	To	Date	Time	Liquid	Solid	Gas	Composite	Grab									
LM031	-6	-	1996	1	3	5/2/96	1445		X			X	1	X							
LM031	-1	-	1996	1	3		1345		X			X	1	X							Very hot.
LM030	-1	-	1996	1	2		0730		X			X	1	X							GWM-100-1000 ppm
LM031	-ERB	-	1996				1345	X				X	2	X							
TB 5296		-	1996			5/2/96	-	X				X	2	X							Trip Blank

5/2/96

Sampler (signature):
Sampler (signature):

Special Instructions:

Relinquished By:	Date/Time	Received By:	Date/Time
(signature)	5/2/96 1900	(signature)	5-3-96 1000
Relinquished By:	Date/Time	Received By:	Date/Time
(signature)		(signature)	

Condition of Shipping Container: Good [X] Fair [ ] Poor [ ]
Ice Present in Container: Yes [ ] No [ ]
Comments: RECEIVED AT 4°C

Burns & McDonnell Waste Consultants, Inc.

022194 form WCI-OP1

IEA
An Aquarion Company

126 West Center Court
Schaumburg, Illinois 60195

Phone 1-800-933-2580
Fax 847-705-1567

May 30, 1996

Burns & McDonnell
Scott Kolb
999 Oakmont Plaza Drive

Westmont, IL 60559

Dear Scott Kolb:

Please find enclosed the analytical results of the samples received at our laboratory on May 06, 1996. This report contains sections addressing the following information at a minimum:

-Definitions
-Analytical Methodology
-State certifications
-Analytical Results
-Chain-of-custody (if applicable)

IEA Project#: L72960749 Client Project: 95-465-4-501

Purchase Order#:

IEA Quote#: Site:

Copies of this analytical report and supporting data are maintained in our files for three years; samples are retained for two weeks unless special arrangements have been made. Unless specifically indicated, all analytical testing was performed at this laboratory and no portion of the testing was subcontracted.

We appreciate your selection of our services and welcome any questions or suggestions you may have relative to this report. Please contact Jim Dowse at (800) 933-2580 for any additional information. Thank you for utilizing our services, we hope you will consider us for your future analytical needs.

I have reviewed and approved the enclosed data for final release.

Sincerely

Larry D. Lewis
Director of Operations
IEA-Illinois Laboratory

IEA
An Aquarion Company

Definitions of Data Qualifiers

Organic Analysis

B - This analyte was detected in the method blank associated with this sample. The concentration reported in the method blank is suspected to contribute to the reported concentration of the analyte in the sample.

E - The concentration reported for this compound exceeds the calibration range of the instrument.

H - This sample had one or more surrogate recoveries above the acceptance criteria due to coelution with a nontarget compound.

J - The reported concentration for this compound is an estimated value. When associated with tentatively identified compounds (TICs), the result is quantitated based on a response factor of 1. When the flag is associated with a calibrated target compound, the compound has been positively identified and the reported concentration is above the method detection limit (MDL), but below the practical quantitation limit (PQL).

L - This sample had one or more surrogate recoveries below the acceptance criteria due to matrix effects. This effect was confirmed through a second analysis of the sample.

LI - The recovery of the internal standard corresponding to this compound did not meet the acceptance criteria due to matrix effects. This effect was confirmed through a second analysis of the sample.

T1 - The chromatographic profile of this sample does not match that of a gasoline standard. Another unidentifiable petroleum product is present in this sample. Quantitation is based on a gasoline standard calibration.

T2 - The chromatographic profile of this sample does not match that of a diesel fuel standard. Another petroleum product is present in this sample. Quantitation is based on a diesel fuel standard calibration.

U - This compound was not detected in the sample above the PQL.

UD - This compound was not detected above the elevated PQL in this diluted analysis.

Inorganic Analysis

E - The reported value was estimated due to the presence of interference.

M - Duplicate injection precision was not met.

N - Spiked sample recovery was not within control limits.

S - The reported value was determined by the Method of Standard Additions(MSA).

W - Post digestion spike for Furnace AA analysis is out of control limits (85-115%), while sample absorbance is less than 50% of spike absorbance.

* - Duplicate analysis was not within control limits.

+ - Correlation Coefficient for the MSA is less than 0.995.